

Remarks/Arguments

In the response to the Office Action dated September 16, 2005, in the second paragraph, applicants noted that the objections to the drawings under 37 CFR § 1.83(a) and the claims under 35 USC § 112 in Paragraphs 1-5 of the Office Action have been fully addressed in a petition to the Commissioner accompanying the September 16th response. In Paragraph 4 of the Office Action, Claims 1-5, 7, 9, 10, 14 and 15 were rejected under 35 USC § 112, first paragraph, as failing to comply with the enablement requirement. The Examiner asserted that the claims contain subject matter which was not described in the specification in such a way as to enable one skilled in the art to which it pertains, or with which it is most nearly connected, to make and/or use the invention. More particularly, the Examiner asserted that the disclosure and claims refer to a relative difference in size of the fuel element contact area, between the contact area of the “first set of dimples and/or springs” versus the contact area of the “second set of dimples and/or springs”. In this regard, the Examiner asserted:

The disclosure, however, fails to describe what this actual fuel element “contact area” is or what it consists of, nor is it shown in the drawings.

One known type of fuel element contact area consists of a form of point contact wherein the spring and/or dimple has a flat or outwardly curved surface or bridge which contacts the curved fuel element surface, forming a generally “point” contact to minimize or limit contact of the spring and/or dimple with the fuel element surface (as in Wolters, Jr. et al. (US 4357298) in Figs. 5A, 5B and col. 5 lines 24+ and, as in Delmario et al. (US 4692302).

A known alternative type of fuel element contact area is where the dimples and/or springs have an inwardly curved surface conforming to the curved surface of the fuel element which increases the fuel element surface contact area.

From applicants drawings and specification, it appears that applicants contact area is of the first type, i.e., “point contact”.

There is accordingly, no adequate description nor enabling disclosure of what all is meant by and is encompassed by the references to a difference in fuel element “contact area” between that of the “first set” and that of the “second set”, especially since applicants disclosure is directed only to the presence of a “point contact” area.

In Paragraph 5 of the Office Action, Claims 1-5, 7, 9, 10, 14 and 15 were rejected under 35 USC § 112, second paragraph, as being indefinite for failing to particularly point out and

distinctly claim the subject matter which applicant regards as the invention. In this regard, the Examiner asserted that:

The claims are vague, indefinite and incomplete, particularly as to what all is meant by and is encompassed by the references to a difference in fuel element "contact area" between that of the "first set" and that of the "second set", especially since applicants disclosure is directed only to the presence of a "point contact" area.

In the Examiner's rejection in Paragraph 4, the Examiner admits that the disclosure and claims refer to a relative difference in size of the fuel element contact area between the contact area of the first set of dimples and/or springs versus the contact area of the second set of dimples and/or springs. Giving the words their common meaning, that would mean that the dimples or springs in the auxiliary grid have a larger contact area over the surface of the fuel element than the corresponding dimples and springs on the main support grids. In the specification, on page 11, starting at line 3, the specification states:

In the preferred embodiment of this invention, the auxiliary vibration resistant grids preferably take the form illustrated in Figures 6 and 7. From Figure 6, it can be seen that the dimples and/or springs 88,86 are coplanar and contact the fuel rods on multiple sides to provide additional rod support.

The specification goes on to state on page 11, starting at line 29:

The inner straps 76 and 78 on the auxiliary grids provide for a larger contact area between the dimples/springs and the fuel elements than are provided by the corresponding contact areas on the main support grids 46. The contact lengths for the vertical springs and dimples on the auxiliary grids are 2.54 cm as compared to a corresponding contact length of .5 cm on the main support grids. This latter feature plus the location(s) of the auxiliary anti-vibration support grids 68 in the fuel assembly 16 eliminate the fuel rod instability that leads to grid-to-rod fretting in high crossflow plants with pressure relief holes.

Nowhere in the specification is there any mention of "point contact" and the specific contact lengths of the springs noted in the specification disprove the Examiner's assumption that the specification and claims describe "point contact". Accordingly, the difference in contact area set forth in the claims is clear and unambiguous and is fully supported by the specification.

The objection raised by the Examiner in Paragraphs 4 and 5 of the Office Action mailed July 19, 2005 are related to the rejections set forth in Paragraphs 1, 2 and 3 of the Office Action.

To fully appreciate the appropriateness of these objections, it is instructive to understand the underlying history of the prosecution of this application as follows:

The first substantive action in the prosecution of the above-identified application was mailed on July 8, 2004. In Paragraph 2 of that Office Action, the Examiner objected to the drawings as not showing every feature of the invention specified in Claims 8, 9 and 13. In addition, Claims 1-10, 13 and 14 were rejected under 35 USC § 112, second paragraph. The Examiner asserted that the claims were vague and indefinite for failing to recite what distinguishes the auxiliary grid from the main support grid. The Examiner felt that this feature, according to the specification, was critical to the invention and that the invention would not operate as intended if the auxiliary grids were identical to the main support grids. Claim 1 was asserted as being vague and indefinite with regard to how and in what manner the auxiliary grid can have more than one support cell for each fuel element (the Examiner focused on the language "at least one") and Claim 8 had no proper antecedent basis for the phrase "corresponding dimples and/or springs". The Examiner also objected to the phrase in Claim 8 that the dimples and/or springs on the auxiliary grids have a larger contact area than that on the main support grids.

In a response mailed on September 22, 2004, applicants amended Claim 1 to incorporate the subject matter of Claims 6 and 8 and cancel Claims 6 and 8. Claim 7 was also amended to add that "the main support grid cells have walls..." to correct an antecedent basis issue. For the purpose of comparison, Fig. 6 as originally filed is attached hereto as Exhibit A. Fig. 6 was amended in the response to show a control rod guide thimble tack-welded to an auxiliary grid cell. The amended Fig. 6 is attached hereto as Exhibit B. In response to the drawing objection that the drawings must show every feature of Claims 8, 9 and 13, applicants responded in the Remarks section:

Claim 8 calls for a first set of dimples and springs located on the walls of the main support grid cells for supporting the fuel rods and a second set of dimples and springs located on the walls of the auxiliary grid support cells for supporting the fuel rods wherein the second set of dimples and/or springs on the auxiliary cells have a larger contact area with the fuel elements than the first set of dimples and/or springs on the walls of the main support grid cells. Figure 5 shows the dimple spring arrangement of the main support grids wherein the springs are on a diagonal. In contrast, the outer strap 72 of the auxiliary grid 68 shown in Figure 6 clearly shows the springs 86 of the auxiliary grids are vertical. The description in the specification starting on

line 29 of page 11, describes that the auxiliary grids provide for a larger contact area between the dimples/springs and the fuel elements than are provided by the corresponding contact areas on the main support grids 46. There is no requirement that the patent drawings be drawn to scale, and these features are clearly shown.

Claim 9 calls for the fuel assembly of Claim 8 wherein the dimples and/or springs on the walls of the respective auxiliary grid support cells are co-planar. Referring to Figure 6, it can clearly be seen that a common plane intersects both the vertical springs and the dimples, which is not the case in the main support grid design.

Claim 13 recites that the auxiliary grid is mechanically or metallurgically affixed to at least some of the guide tubes. The amended Figure 6 clearly shows the guide tube through an auxiliary grid attached at the cell corners by butt-welds. Accordingly, amended Claim 6 should cure the Examiner's objections to the drawings.

Applicants then responded that they thought the amendments to the specification and claims would clearly overcome the objections raised under 35 USC § 112.

The Examiner responded with a final rejection mailed December 22, 2004, again rejecting the drawings for not showing every feature of the invention specified in the claims. The Examiner asserted that the features of Claims 1, 9 and 13, with respect to the relative size of the contact areas of the dimples and/or springs of the auxiliary support cells versus the main support cells, must be shown. The Examiner considered applicants' arguments unpersuasive and argued:

It is immaterial as to whether Fig. 6 shows the outer strap of the auxiliary grid as having vertical springs because the claimed relative difference in contact area of the dimples and/or springs, is with the inner straps of the two different grids (e.g. see the specification on page 11 lines 29+).

The examiner does not dispute that patent drawings do not have to be drawn to scale, however, the drawings are required by the Rules to show every feature recited in the claims (this clearly includes the claimed relative difference in size of the contact area of the dimples and/or springs of the inner straps of the two different grids)

None of the drawing figures illustrate the actual contact areas of any of the springs and/or dimples.

Despite applicants arguments to the contrary, it is not seen wherein Fig. 6 shows both vertical springs and dimples on the inner straps nor does it show a common plane intersecting both the vertical springs and the dimples.

Amended Fig. 6 does not clearly show a guide tube attached at the cell corners by butt-welds (it is not known what the slightly darkened portions at the two illustrated diagonal corners of the cell (through which the guide tube passes) is supposed to represent).

Additionally, it has not been shown that the term “mechanically or metallurgically affixed” inherently means a “butt-weld” and, that in this art, such “butt-welds” inherently span the space between the square cell corner and the outer circumference surface of the guide tube.

The Examiner further objected to the amendment to the specification, stating that Fig. 6 shows a 15x15 array, not a 17x17 array.

In a response mailed February 22, 2005, applicants amended Fig. 6 (attached hereto as Exhibit C) showing the welds attaching the control rod guide tubes to the grid cell in a more pronounced fashion and labeling them with reference character 79. Reference character 79 was also added to the corresponding description in the paragraph spanning pages 11 and 12. Fig. 6 was also amended to better show that the springs in the grid cells that have springs, i.e., fuel rod support cells, are co-planar and are oriented in the vertical direction. Support for both of these changes can be found on page 11 of the specification. The specification was additionally amended to correct the reference to Figs. 4 and 6 in the paragraph beginning on page 9, line 24. It should be clear from the figures that Fig. 6 illustrates a 15x15 array and Fig. 4 shows a 17x17 array. In the Remarks/Arguments section of the response of February 22nd, applicants identified that they disagreed with the Examiner that the drawings did not show the relative size of the contact areas of the dimples and/or springs of the auxiliary support cells versus the main support cells, and that the features of Claims 9 and 13 were not shown. However, for the sake of advancing prosecution, applicants have further amended Fig. 6 to clearly show that the dimples and/or springs are on the vertical and they are all within the same plane. Applicants directed the Examiner’s attention to Fig. 5, which shows the springs of the traditional grid on a diagonal with the contact area shown relative to the width of the cell as being substantially less than that shown for the vertical springs and dimples shown in Fig. 6 relative to the cell wall width illustrated in Fig. 6. In support of this proposition, applicants cited the Federal Circuit opinion in *Hockerson-Halberstadt Inc. vs Avia Group International, Inc.* (222 F.3d 951, 956, and 55 USPQ F.2d 1487, 1491, Federal Circuit 2000) which stated: “It is well established that patent drawings do not define the precise proportions of the elements and may not be relied on to show particular sizes if

the specification is completely silent on the issue”. In this instance, the specification does add to the drawings by clearly stating on page 11, starting at line 6, that the dimples and/or springs are co-planar and, on line 8, that the springs are on the vertical rather than on the diagonal. Starting at line 29, the specification specifically states: “The inner straps 76 and 78 on the auxiliary grids provide for a larger contact area between the dimples/springs and the fuel elements than are provided by the corresponding contact areas on the main support grids 46”. Applicants also cited the opinion of the Court of Customs and Patent Appeals stated in *In re: Chitayat*, 408 F.2d 475, 161 USPQ 224 (1969) that: “Arguments based on mere measurement of patent drawings are of little value in the absence of a description in the specification of relative dimensions. Here, we have both a clear statement in the specification and the relative dimensions of the prior art springs shown in Fig. 5 relative to the width of the cells walls as compared to those of the invention shown in Fig. 6. Applicants also cited the opinion in *In re: Wilson* 312 F.2d 449, 454, and 136 USPQ 188, 192 (CCPA 1963), which stated: “Patent drawings are not working drawings [and arguments are not persuasive when based on a [drawing] obviously never intended to show the dimensions of anything.]” The court further stated in *In re: Olson* 212 F.2d 590, 592, 101 USPQ 401, 402 (CCPA 1954): “Ordinarily, drawings which accompany an application for a patent are merely illustrative of the principles embodied in the alleged invention claimed therein and do not define the precise proportions of the elements relied upon to endow the claims with patentability”. Relying upon the above authority, applicants requested that the objection to the drawings regarding the relative contact area be withdrawn.

With regard to Claim 13, which calls for the auxiliary grids being maintained in their axial position by being mechanically and metallurgically affixed to some of the guide tubes, applicants pointed out that reference character 79 has been added to Fig. 6 to clearly show weld connections between the guide thimbles and the grid straps. Applicants further pointed out that it is well known in the art that a weld creates a metallurgical connection between the welded members and that the references cited by the Examiner evidence that it is also well known to create a mechanical connection at the joint as a means of affixing the guide thimbles or sleeves that the guide thimbles are attached to, to the cell walls. In view of the foregoing arguments and the amendments to the specification, it was respectfully requested that the objections raised in Paragraphs 1 and 2 of the Office Action be withdrawn.

On April 7, 2005, an Advisory Action was issued in which the Examiner refused to enter the amendments asserting that they raise new issues; they raise the issue of new matter; that they are not deemed to place the application in better form for appeal; and that they present additional claims. In the comment section, the Examiner stated that the proposed drawing correction to Fig. 6 has not been approved, as it is drawn to new matter for the same reason set forth in Section 1 of the 12/22/04 Office Action. Referring back to the 12/22/04 Office Action, applicants could not identify any objection to new matter.

On April 27, 2005, applicants had a telephone interview with the Examiner to discuss the objections to the drawings and the rejections based upon references. Applicants agreed to cancel Claim 13 to remove the issues concerning the guide thimble and its attachments which were not considered particularly relevant to the invention.

On May 5, 2005, applicants submitted a Request for Continued Examination and entry of an amendment enclosed therewith, which modified Fig. 6 (attached hereto as Exhibit D) as previously amended as shown in Exhibit C attached herewith and discussed with the Examiner during the telephone interview. The amendments to the specification were essentially those previously submitted but not entered with the amendment of February 22nd. Claim 1 was additionally amended to make explicit an inherent limitation previously in the claim wherein the auxiliary grid is supported between two main support grids without any other auxiliary grids between the auxiliary grid and the adjacent main support grid. Claim 13 was cancelled as previously noted. The arguments in support of the drawings were essentially those previously submitted in the amendment of February 22nd that had not been entered.

A new non-final Office Action was mailed July 19, 2005 containing five sections of objections to the drawings under 37 CFR § 1.83(a) and the claims under 35 USC § 112. It is respectfully asserted that the position that the Examiner has taken is extreme, without reasonable foundation and for which relief is hereby sought. In the first instance, the Examiner has objected, under 37 CFR § 1.83(a), that every feature of Claims 1 and 15 relative to the size of the contact areas of the dimples and/or springs, are not shown and with regard to Claim 9 and they are not shown in the same plane. As previously explained, Fig. 5 shows the springs in the main support grid on a diagonal with raised sidelegs and a center flat portion which contacts the circumference of the fuel element. Fig. 6 in Exhibit D shows that the springs and dimples are vertically aligned and also have a raised leg area and center flat area that contacts the outer

circumference of the fuel element. The width of the springs in Fig. 6 compared to the width of the cell is a much larger ratio than that shown in Fig. 5 for the main support grid. In addition, since the spring in the main support grid shown in Fig. 5 is on a diagonal, not as much of the flat surface of the spring would be contacting the circumference of the fuel element as compared to the vertical springs in the auxiliary grids illustrated in Fig. 6. Therefore, the relative size of the contact areas of the dimples and/or springs of the auxiliary support cells versus the main support cells is clearly shown in the figures. Support in the specification can be found on page 11, starting at line 29, where it is stated "the inner strap 76 and 78 on the auxiliary grids provide for a larger contact area between the dimples/springs and the fuel elements than are provided by the corresponding contact areas on the main support grids. The contact lengths for the vertical springs and dimples on the auxiliary grids are 2.54 cm as compared to a corresponding contact length of .5 cm on the main support grids". On page 11, starting at line 5, the specification states "From Figure 6, it can be seen that the dimples and/or springs 88,86 are co-planar and contact the fuel rods on multiple sides to provide additional rod support. In this embodiment, the springs are vertical rather than on a diagonal". It should be clearly evident from the illustration of the auxiliary grid shown in Fig. 6 (Exhibit D) that the dimples and springs are all on the same plane. Accordingly, it is respectfully asserted that the objection of the Examiner is in error and withdrawal is hereby requested.

The Examiner went on to state that:

While applicants Fig. 6 shows vertical springs on the outer strap of the auxiliary grid, it does not show vertical springs on the inner strap (the inner strap only shows a horizontal dimple at the upper end of the cell wall).

It is immaterial as to whether Fig. 6 shows the outer strap of the auxiliary grid as having vertical springs because the claimed relative difference in contact area of the dimples and/or springs, is with the inner straps of the two different grids.

At the bottom of page 3 of the Office Action, the Examiner went on to assert that:

Despite applicants arguments to the contrary, it is not seen wherein Fig. 6 shows both vertical springs and dimples on the inner straps nor does it show a common plane intersecting both the vertical springs and the dimples.

Applicants are at a loss as to what the Examiner is referring to, because the amendment provided to Fig. 6 in Exhibit D, which accompanied applicants' Request for Continued Examination, clearly shows the springs and/or dimples on the inner straps in a vertical orientation, all on the same plane. 37 CFR § 1.83(a) provides:

The drawing in a non-provisional application must show every feature of the invention specified in the claims. However, conventional features disclosed in the description and claims where their detailed illustration is not essential for a proper understanding of the invention, should be illustrated in a drawing in the form of a graphical drawing symbol or a labeled representation...

It is respectfully asserted that applicants have complied with this requirement. In Paragraph 2 of the Office Action, the Examiner has asserted that Fig. 6 (in Exhibit D) has not been approved as it is drawn to new matter. It is respectfully asserted that the amendments to Fig. 6 were merely made to conform the drawings to the description in the specification as quoted above. Therefore, the same should not be considered new matter.

In the rejection of Claims 1-5, 7, 9, 10 and 15 under 35 USC § 112, first paragraph in Section 4 of the Office Action, the Examiner cited Wolters, Jr. et al. (US 4357298) in Figures 5A, 5B and col. 5 lines 24+ and, as in DeMario et al. (US 4692302).

The reference to Wolters, Jr. et al. quoted by the Examiner states:

At their apexes, the spring members 63(1) and 63(2) are formed with bosses or protuberances 64 for limiting contact area with the fuel rod in the cell.

This quotation has no relevance to applicants' invention. The relevance of DeMario et al. is similarly unclear and it would be appreciated if the Examiner would specifically cite the teaching in the DeMario specification the Examiner is relying on. Clearly from the specification, it is applicants' objective to increase the contact of the springs with the outer surface of the fuel element at the auxiliary grids as compared to the main support grids. It appears that the Examiner is attempting to manufacture an argument that just doesn't exist. As a practical matter, the pressure of the flat outer surface of the springs on the outer circumference of the fuel rods will, to a degree, deform the flat surface of the springs to conform to the outer surface of the fuel rods. The degree of deflection is irrelevant since the specification clearly states that what is important is that there be more contact area at the auxiliary grids than at the main support grid.

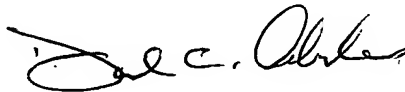
Accordingly, it is respectfully requested that the objection raised by the Examiner in Paragraphs 4 and 5 are erroneous and should be withdrawn.

It is respectfully noted that applicants are at a loss as to how the relative contact areas between the dimples and springs in the fuel rods for the two different types of grids could have been stated more clearly in the claims to satisfy the requirements of Section 35 USC § 112. If the Examiner has any suggestions in that regard, it would be gratefully appreciated.

Accordingly reconsideration, allowance and passage to issue of this application are respectfully requested.

Enclosed is a credit card authorization to charge any fees required to Eckert Seamans Deposit Account No. 02-2556.

Respectfully submitted,



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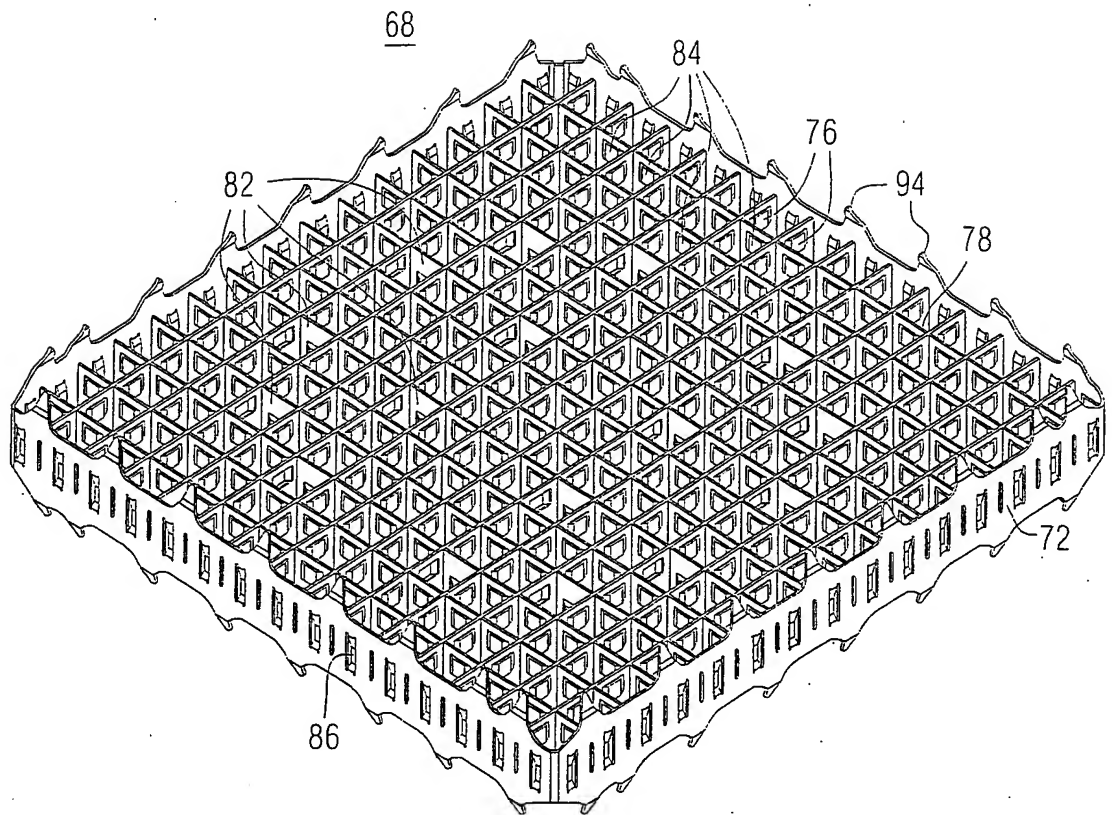


FIG. 6

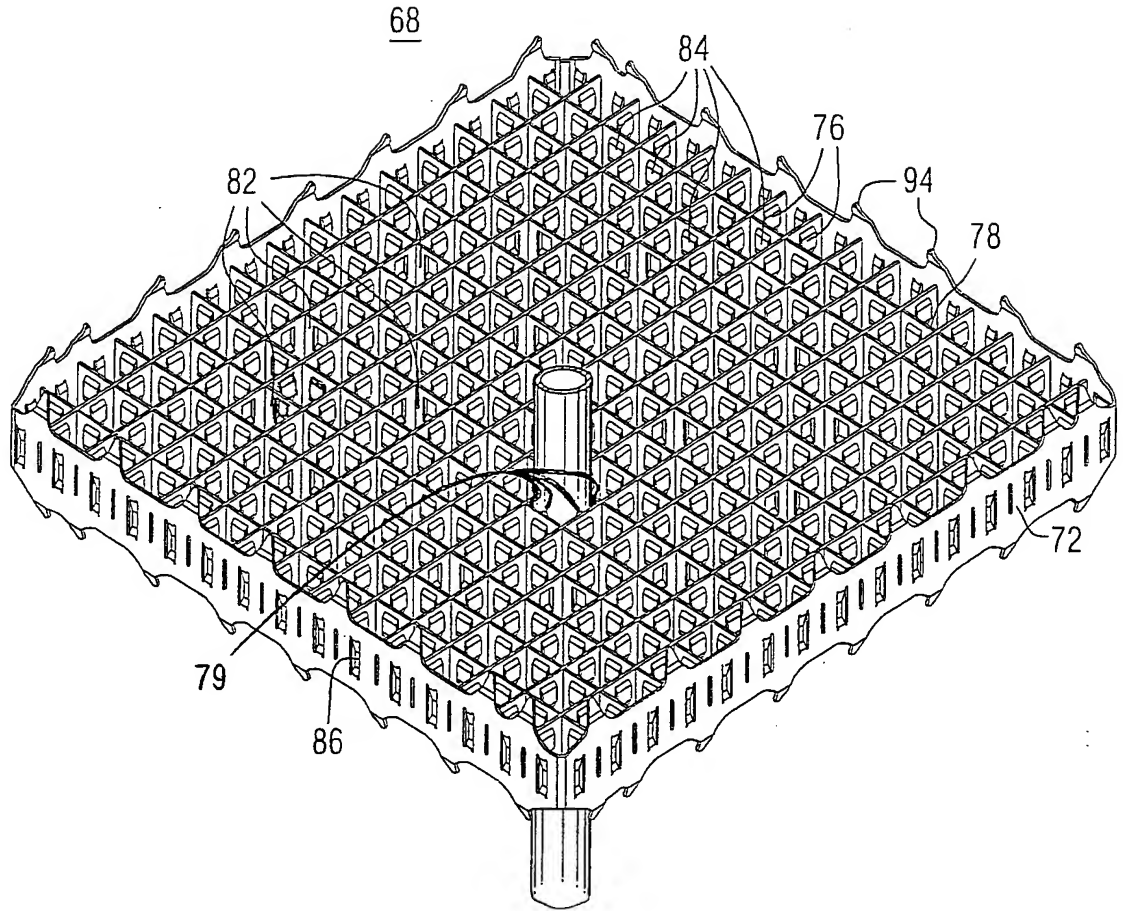


FIG. 6